



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/091,106	03/05/2002	John Commander	CEDE 2036	5919
321	7590	10/09/2007	EXAMINER	
SENNIGER POWERS ONE METROPOLITAN SQUARE 16TH FLOOR ST LOUIS, MO 63102			WONG, EDNA	
			ART UNIT	PAPER NUMBER
			1795	
			NOTIFICATION DATE	DELIVERY MODE
			10/09/2007	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspatents@senniger.com.

## Office Action Summary

Application No.

10/091,106

Applicant(s)

COMMANDER ET AL.

Examiner

Edna Wong

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 September 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-7, 17 and 65-77 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7, 17 and 65-77 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

This is in response to the Amendment dated September 5, 2007. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Response to Arguments***

**Claim Rejections - 35 USC § 112**

I. Claims **76 and 77** have been rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The rejection of claims 76 and 77 under 35 U.S.C. 112, first paragraph, is as applied in the Office Action dated June 26, 2007 and incorporated herein. The rejection has been maintained for the following reasons:

**Claim 76**

lines 2-3, recites "copper ion in a proportion between ***about 10 g/L and about 50 g/L***".

**Claim 77**

line 3, recites "between 59 g/L and ***about 75 g/L*** copper sulfate pentahydrate".

Applicants state that the meaning of these phrases is either identically the same or, if any difference between them is perceived, the phrase "on the order of 10 g/L to on the order of 50 g/L" in the specification unequivocally conveys to one of ordinary skill in the art that the applicants also had possession of "about 10 g/L to about 50 g/L." As a matter of common sense, the bridge between these phrases is so minimal that one skilled in the art would instantly comprehend that the inventor could not be in possession of one without being in possession of the other.

In response, Applicants' specification, pages 1-15, does not mention copper ion in a proportion between a proportion between about 10 g/L and about 50 g/L and between 59 g/L and about 75 g/L copper sulfate pentahydrate. Thus, there is insufficient written description to inform a skilled artisan that applicant was in possession of the claimed invention as a whole at the time the application was filed.

However, there is sufficient written description for the copper electroplating bath may vary widely depending on the substrate to be plated and the type copper deposit desired. An acid bath is preferred and an exemplary copper plating bath because of its demonstrated effectiveness has **a copper ion concentration of about 15 to 19 g/l** and **a copper sulfate concentration as the pentahydrate of 59 to 75 g/l** (page 11, lines 23-29).

The Examiner has carefully considered the entire specification as originally filed, however, there is found no literal support in the specification for the limitations in claims 76 and 77. Accordingly, the 35 U.S.C. 112, first paragraph, rejection is maintained.

II. Claims 70, 73 and 75-77 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With regards to claims 70 and 73, the rejection under 35 U.S.C. 112, second paragraph, has been withdrawn in view of Applicants' amendment.

With regards to claim 75-77, the rejection under 35 U.S.C. 112, second paragraph, is as applied in the in the Office Action dated June 26, 2007 and incorporated herein. The rejection has been maintained for the following reasons:

Claim 75

lines 1-2, recites "wherein the electroplating bath comprises copper ion".

Claim 76

lines 1-2, recites "wherein the electroplating bath comprises copper ion".

Claim 77

lines 1-2, recites "wherein the electroplating bath comprises copper sulfate".

Applicants state that the further limitation is in the range of copper ion content.

In response, there is no "copper ion content" recited in claim 1 to further limit, and the claims do not say that the "copper ion" is *the* ionic copper recited in claim 1, line 7. Thus, this limitation does not further limit any element claimed. Thus, are there two

copper sources in the electroplating bath, i.e., the copper ion and the ionic copper? Or are they the same? If they are not, then what is the relationship between the copper ion and the ionic copper?

Applicants state that the recitation in claim 75 of a range for copper unambiguously adds a further limitation.

In response, if the recitation in claims 75-76 adds a further limitation, then the claims would have recited -- wherein the electroplating bath further includes --. Otherwise, the electroplating bath has a separate and independent definition from claim 1, and does not add a further limitation.

Claim Rejections - 35 USC § 102/103

I. Claims 1-3, 5-7, 65-66, 70-71 and 75-77 have been rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over **Barstad et al.** (US Patent Application Publication No. 2006/0183328 A1).

The rejection of claims 1-3, 5-7, 65-66, 70-71 and 75-77 under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Barstad et al. has been withdrawn in view of Applicants' remarks.

II. Claims 17 and 72-73 have been rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over **Barstad et al.** (US

Patent Application Publication No. 2006/0183328 A1).

The rejection of claims 17 and 72-73 under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Barstad et al. has been withdrawn in view of Applicants' remarks.

Claim Rejections - 35 USC § 103

I. Claims **4 and 67-69** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **Barstad et al.** (US Patent Application Publication No. 2006/0183328 A1) as applied to claims 1-3, 5-7, 65-66, 70-71 and 75-77 above.

The rejection of claims 4 and 67-69 under 35 U.S.C. 103(a) as being unpatentable over Barstad et al. as applied to claims 1-3, 5-7, 65-66, 70-71 and 75-77 above has been withdrawn in view of Applicants' remarks.

II. Claim **74** has been rejected under 35 U.S.C. 103(a) as being unpatentable over **Barstad et al.** (US Patent Application Publication No. 2006/0183328 A1) as applied to claims 1-3, 5-7, 65-66, 70-71 and 75-77 above, and further in view of **Pedersen et al.** (US Patent No. 6,673,216 B2).

The rejection of claim 74 under 35 U.S.C. 103(a) as being unpatentable over Barstad et al. as applied to claims 1-3, 5-7, 65-66, 70-71 and 75-77 above, and further in view of Pedersen et al. has been withdrawn in view of Applicants' remarks.

***Response to Amendment***

***Claim Objections***

Claims **75-77** are objected to because of the following informalities:

Claim 75

lines 1-2, the words "A process as set forth in claim 65" should be amended to --  
The method of claim 65 --. Claim 65, line 1, recites "The method of claim 1". There is no  
process set forth in claims 1 or 65.

Claim 76

lines 1-2, the words "A process as set forth in claim 65" should be amended to --  
The method of claim 65 --. Claim 65, line 1, recites "The method of claim 1". There is no  
process set forth in claims 1 or 65.

Claim 77

lines 1-2, the words "A process as set forth in claim 65" should be amended to --  
The method of claim 65 --. Claim 65, line 1, recites "The method of claim 1". There is no  
process set forth in claims 1 or 65.

Appropriate correction is required.



***Claim Rejections - 35 USC § 112***

Claims **72 and 73** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

**Claim 72**

line 2, "said overall sulfur content" lacks antecedent basis.

**Claim 73**

lines 1-2, "said overall sulfur content" lacks antecedent basis.

***Allowable Subject Matter***

The following is a statement of reasons for the indication of allowable subject matter:

Claims **1-7, 65-71 and 74-77** define over the prior art of record because the prior art does not teach or suggest a method for electroplating a copper deposit onto a semiconductor integrated circuit device substrate with electrical interconnect features including submicron-sized features such that the surface has submicron-sized reliefs therein, the method comprising the steps of immersing and electroplating as presently claimed, esp., wherein the defect reducing agent is a reaction product of benzyl chloride and hydroxyethyl polyethylenimine.

Claims **17 and 72-73** define over the prior art of record because the prior art

does not teach or suggest a method for electroplating a copper deposit onto a semiconductor integrated circuit device substrate having electrical interconnect features including submicron-sized features such that the surface has submicron-sized reliefs therein, the method comprising the steps of immersing and electroplating as presently claimed, esp., wherein the defect reducing agent is a reaction product of benzyl chloride and hydroxyethyl polyethylenimine.

The prior art does not contain any language that teaches or suggests the above. *Barstad et al.* do not teach wherein the defect reducing agent is a reaction product of benzyl chloride and hydroxyethyl polyethylenimine. Therefore, a person skilled in the art would not have been motivated to adopt the above conditions, and a prima facie case of obviousness cannot be established.

Claims 75-77 would be allowable if rewritten or amended to overcome the claim objection(s) set forth in this Office action.

Claims 72-73 and 75-77 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 1<sup>st</sup> and/or 2<sup>nd</sup> paragraphs, set forth in this Office action.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

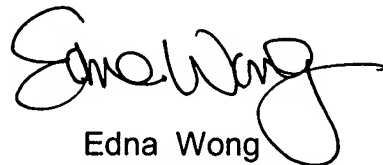
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edna Wong whose telephone number is (571) 272-1349. The examiner can normally be reached on Mon-Fri 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic

Art Unit: 1753

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A handwritten signature in black ink, appearing to read "Edna Wong", with a stylized, flowing script.

Edna Wong  
Primary Examiner  
Art Unit 1753

EW  
September 28, 2007